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SENIOR HIGH SCHOOL

CURRICULUM GUIDE

for

ELECTRONICS

10, 20, 30

Department of Education

Edmonton, Alberta

September, 1966

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EDUCATION LIBRARY
UNIVERSITY OF ALBERTA

E L E C T R O N I C S

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J. R. Bauman, St. Albert, Alberta

K. E. Brown, Edmonton, Alberta

Prof. Milton Petruk, University of Alberta, Edmonton, Alberta

E. A. Umbach, Calgary, Alberta

W. M. Waslewsky, Calgary, Alberta

W. C. Willing, Stony Plain, Alberta

J. D. Harder, Supervisor of Industrial Arts, (Chairman)

INDUSTRIAL ARTS

ELECTRONICS 10, 20, 30

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INDUSTRIAL ARTS

Introduction

The Industrial Arts cluster courses are designed to meet the needs of students who wish to acquire greater depth of understanding in selected industrial areas.

Through these programs students are able to work in an environment which is conducive to challenging intellect and talents in a number of technical and craft areas. Stu ents become aware of the interrelationship and the dependency of one technology upon the others. They have the opportunity to develop broad concepts of the principles and skills required in the various occupations. Students will find it necessary to apply many of the skills they have developed in other school subjects to the solution of practical problems.

This course can contribute greatly to achieving the objectives of secondary education.

General Objectives

Industrial arts is a part of general education and as such instructors need to understand the objectives of the Alberta education program.

Functional Objectives of the Alberta Secondary Schools

1. Personal Development
2. Growth in Family Living
3. Growth Toward Competence in Citizenship
4. Occupational Preparation

OBJ CTIV S OF THE SENIOR HIGH SCHOOL INDUSTRIAL ARTS PROGRAM

The Industrial Arts program helps to attain the functional objectives of Alberta Secondary School Education as set forth above.

Within the scope of these general objectives the unique contributions made possible through Industrial Arts courses are summed up in the following obj ctives:

Industrial Arts courses will provide an opportunity for students:

1. To develop an understanding of related technological clusters and the interrelationship of the technologies within the cluster areas.

2. To develop an understanding of the applications of the academic disciplines in an industrial environment.

3. To study and work in an environment which stimulates the individual to discover and develop his interests and talents.

4. To develop an understanding of man's changing role in an advancing industrialized society.

5. To develop sound safety attitudes with respect for safe working habits and practices in the use of tools, equipment and materials.

6. To develop personal and social responsibility.

7. To develop a degree of skill necessary to satisfactorily perform the operations and processes required by the curriculum.

Definition of Terms

1. Multiple-activity laboratory - a laboratory or shop where three or more activities are in progress at the same time.

2. Area laboratory - a laboratory in which a cluster area is taught, e.g. Electronics 10, 20, 30 would be taught in an electornics laboratory; materials in a materials laboratory.

3. Cluster - or cluster area - the technologies and crafts that are closely related are grouped in clusters. Four main clusters have been developed in the Alberta Senior High School Program.

Electronics - made up of electricity, electronics, computer

Materials - Wood, metal, plastics, craft materials

Graphic Communications - drafting, photography, printing, duplicating

Power Mechanics - Power sources, power transmission

4. Course Unit - a unit consists of from 9-10 weeks of work in a specific area. In all the Industrial Arts courses of both the General and the Cluster areas there are four units of work each year.

Description of The Program

The cluster programs each consist of four units of work. These units are made up of content that is related or shows the interrelationship between the various crafts and technologies.

The emphasis in each course is on understanding the underlying principles involved, how they are put into practical use and how controlled. In addition the proper use of materials, tools and equipment is stressed in areas where these apply.

Scope

The Industrial Arts Cluster courses 10, 20 and 30 are a series of four-five credit courses. Each cluster develops sequential material in the following order:

(next page)

SENIOR HIGH SCHOOL INDUSTRIAL ARTS PROGRAM
(TENTATIVE)

COURSE	NUMBER		
	10	20	30
ELECTRONICS	Basic Electricity-Electronics	Systems Study (2)	Computer Systems
	Systems	Units, Power Supply Amplifier	Computer
	Units of System	Oscillator	Special Study - FM - Video
	Components	Components	- Industrial Control
MATERIALS	Wood	Wood	Wood
	Metals	Metals	Metals
	Plastics	Plastics	Plastics
	Earths or Textiles	Industrial Science	Special Study
GRAPHIC COMMUNICATIONS	Drafting (General)	Drafting	Drafting
	Photography	Photography	Photography
	Printing Processes	Lithography	Lithography
	Printing (cont'd)	Lithography	Special Study
POWER TECHNOLOGY	Internal Combustion Engine	Internal Combustion Engine	Depth Study of Internal Comb.
	Other Power Sources	Electric Sources	Depth Study of Other Than Internal Combustion
	Hydraulics & Pneumatics	Hydraulics & Pneumatics	Two of Hydraulics-Pneumatics
	Mechanical	Electrical Transmission	Mechanical or Electrical
SPECIAL	Research		
	Industrial Science		
	Hot Metals		
	Building Construction		
	Food Science		

Laboratory Organization and Equipment

One laboratory per cluster is to be planned and equipped to handle the program. In some cases where a double or triple facility has been provided certain of the cluster courses may be taught.

The laboratory should be organized so that the various activities that comprise the course can be efficiently taught. The multiple-activity organization is recommended in the courses that lend themselves to this system, e.g., Materials, Graphic Communications.

Transition

The industrial arts cluster courses will replace all the present unit shop courses. Special allowances will be made during the transition period (to 1970). The Supervisor of Industrial Arts, Department of Education, must be notified of deviations from the standard program or credits may be withheld.

Administration

1. Time - Each of these courses may be offered for four - five credits. The number of minutes required per credit should conform with the regulations described in the Senior High School Handbook.

2. Scheduling - Industrial Arts courses can be satisfactorily taught in blocks of time from 50 to 200 minutes. Double period blocks twice a week have proven very satisfactory.

3. Class Size - A maximum class size of twenty is suggested. When student numbers go beyond that, student and teacher efficiency is seriously hampered because of insufficient space and equipment. Industrial arts laboratories in this province are not planned to cope with numbers larger than twenty.

4. Records - Every instructor should keep the following records:
(a) Enrolment and attendance
(b) Daily lesson plan
(c) Yearly plan
(d) Record of student achievement
(e) Inventory of equipment and supplies.

It is recommended that the records be kept in a simple, efficient manner.

5. Student Evaluation - Evaluation must be based on what the student has learned "know", and what he has done "do". The following is a suggested criteria for grading students.

Related Theory - tests, written exercises, reports ("Know" Column)	50%
Activity - projects experiments, operations performed ("Do" Column)	50%

Safety Program

Every shop must have an effective safety program. This does not mean that the promulgation of a set of rules and regulations will satisfy this end. Students must be taught in each and every subject studied within the industrial arts framework, the "hows and whys" inherent in the safety program. It is the responsibility of the instructor to suppl continuous and vigilant supervision and to ensure that all students engage in only safe shop practices. A good safety program would include:

1. Regular and thorough instruction and revision.
2. Constant vigilance.
3. Checking and evaluation of student safety habits by the instructor.
4. Complete first aid equipment kept in first-class condition.
5. Non-skid paint and clearly marked working areas around all machinery.
6. Proper clothing with particular attention to eye protection.
7. Machines and tools in good working condition.
8. Routine reporting of all accidents.
9. Good housekeeping.

The following is a sample of safety regulations which the instructor might be expected to enforce:

1. No power machines shall be used by any student before specific instruction has been given with regard to safe operation and safety precautions.

2. No power machine shall be used while the instructor is absent from the shop.

3. No machine shall be used by any student unless adequately guarded.

4. Approved eye protection must be worn for certain operations.

Note: A good safety slogan which should be put into practice at all times - a place for everything and everything in its place.

There a e five basic steps in safety education:

1. Set a good safety example for student.

2. Instruct each student thoroughly in the safety precautions of his job.

3. Keep all tools sharp and in good condition.

4. Keep all safety devices in proper use.

5. Follow up safety instructions constantly. The shop will be as safe as the instructor makes it.

Dress and deportment play an important part in the operation of a safe shop program. Students and instructor should be neatly dressed at all times and the instructor should take care to ensure that no loose and dangerous clothing is worn. Safety aprons, goggles, gloves, should be used wherever necessary.

It should be pointed out that failure to comply with every reasonable safety precaution, may jeopardize the instructor's position in any claim for compensation. Each school should receive the excellent publications and bulletins dealing with accident prevention and safety procedures distributed by the Workmen's Compensation Board.

Note: Accidents must be promptly reported to some senior school authority. If no other person is designated, this authority is the Principal.

Introduction

The approach to teaching electronics in the industrial arts courses is to develop broad concepts of:
- first the total system
- second the units that comprise the system
- third the components that make up the units
- fourth the physical laws that are operative in the function of the whole system.

For example, a student would start the course by learning about safety precautions both for personal reasons and protection of instruments, symbols and schematics and the basic uses of the common instruments.

Having had this preliminary experience he would study one of the systems. Through measurement and testing he will discover what happens to the signal as it passes through the system. Next the system is broken into basic units and these are studied individually e.g. power supply. Finally he identifies and studies the function and physical laws of the components e.g. resistors, capacitors, inductors.

In the first year of the program about two thirds of the time should be spent on studying various systems. In the second year the emphasis is placed on the units that comprise the systems and in the third year components and the physical laws are concentrated upon.

Parallel to the development of the electronics program the teacher should be aware of the interrelationships that exist among the units of each cluster and also between the clusters such as electronics and power mechanics e.g. telemetering and industrial control.

Objectives

1. To teach the correct use of common and special instruments and the principles involved.

2. To familiarize students with some of the basic electronic circuits and their applications.

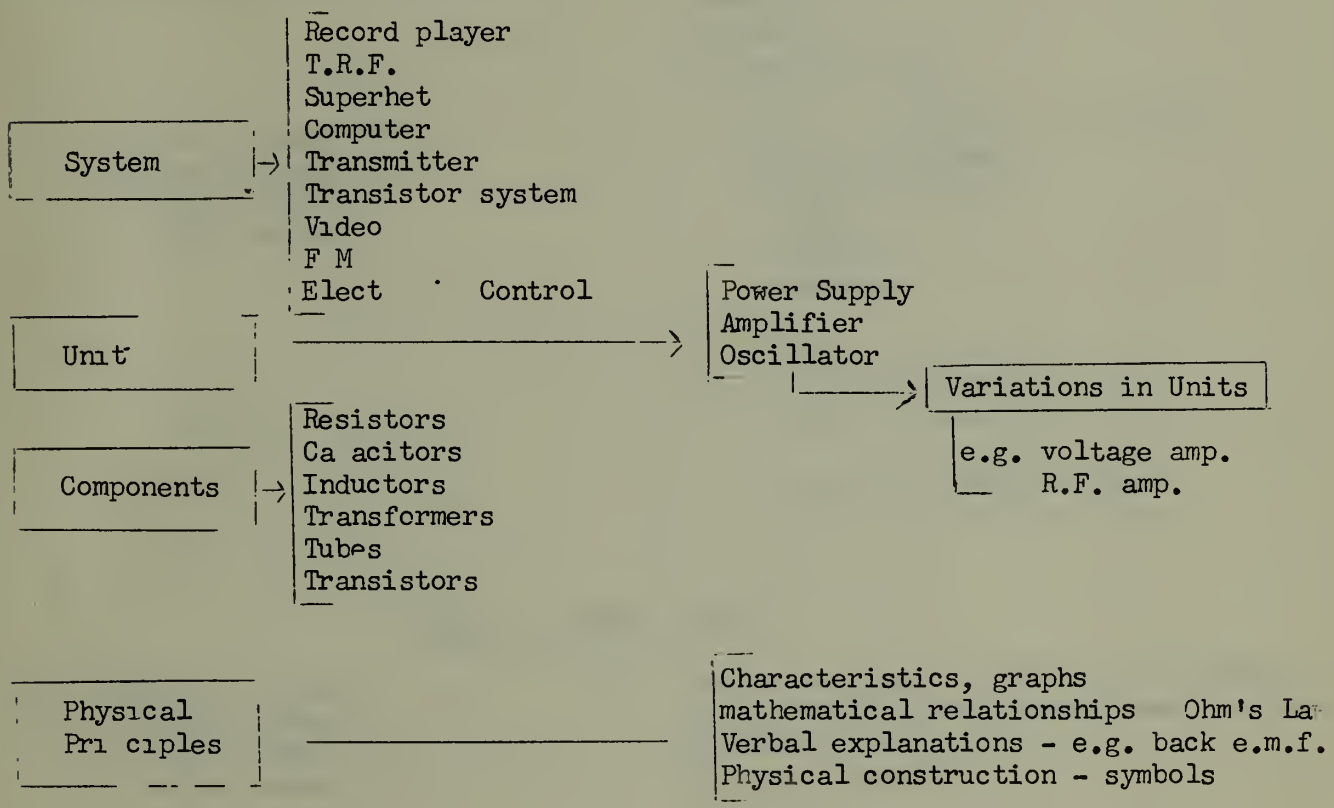
3. To familiarize students with the basic principles and fundamentals of radio and television communications and computer systems.

Time Distribution

Electro s 0 20 30

2/3	Systems	Systems	Systems
		Units	Units
1/6	Units		Components
1/6	Components	Components	

Block Diagram of Systems Appr ach



Unit 1 Basic Electricity - Electronics

Course Content

What the student should be able to:

DO	KNOW
1. Films Demonstrations	1. General Information - Safety - Symbols - Schematics
2. Measurement - Voltage - Resistance - Current	2. Instrument Use - V.O.M. - V.T.V.M. - Oscilloscope - Ammeter - Voltmeter - Signal Generator
3. Identify blocks Measure voltage - input signal - output signal	3. (a) Study a minimum of two systems from the following Record player - T.R.F. - Superhet - Computer (b) Overview of system - Identification of its - Input - classification A.F. or R.F. - wave form - size - Output - classification - wave form - size

Unit 2 Systems Study

4. Identify blocks Measure voltage - input signal - output signal	4. Study a minimum of three of the following systems (do not repeat those studied in Unit 1) - Record player - T.R.F. - Superhet Computer - Transmitter

4.		4.	(Cont.) - Transistor - Video - F.M. - Electronic control (use same overview as under 3 (b))
5.	Study function and operating principles of each unit.	5.	The basic principles of operation of the following units from the systems studied above - Power supply - Amplifier - Oscillator

Unit 3 Units of a System

6.	Assemble, test and compare units (bread boarding).	6.	Variations of the units (a) Power supplies - Half wave - Full wave bridge (b) Amplifier - Audio frequency - Voltage and power - Radio Frequency (c) Oscillator - Armstrong - Hartley

Unit 4 Components of a System

7.	(a) Measure and compare coded values with measured values (b) Identify and compare characteristics (c) Construction and production of components	7.	Components (a) Resistors (b) Capacitors (c) Inductors (d) Transformers (e) Tubes (f) Transistors

16 MM Films

The Vacuum Tube in Radio
T - 307 Audio Visual Aids Branch

Radio Receivers
T-839 Audio Visual Aids Branch

Television-Land of New Frontiers
DeVry Technical Institute

The Matic in Television Tubes
DeVry Technical Institute

America's Rising New Giant
DeVry Technical Institute

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1 Gerrish Electricity and Electronics, Goodheart - Willcox Co Inc , 1964

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ELECTRONICS 20

Unit 1 Systems Review

Course Content

What the student should be able to.

DO	KNOW
1. Use instruments to measure - voltage - current - resistance	1. Review of instrument use
2. Test input and output of the system	2. Review systems studied in Electronics 10 and study an additional two systems from those outlined in Unit 2 Electronics 10

Unit 2 and 3 Study of Units in a System

3. Assemble and test types	3. Study the following units in depth (a) Power Supply - Types - Function and analysis - Principles of operation - Applications (b) Amplifiers - Types - Functions and analysis - Principles of operation - Application (c) Oscillators - Types - Functions and analysis - Principles of operation - Applications

Unit 4 Component Study

4. Study the following (a) Ohm's Law as it applies to A.C. and D.C. circuits (b) Capacitance in A.D. - D.C. circuits (c) Inductance in D.C. - A.D circuits	4. Physical and mathematical principles of - Components - Resistors - Capacitors - Inductors - Transformers - Tubes - Transistors

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1. Gerrish, Electricity and Electronics, Goodheart - Willcox Co. Inc., 1964
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8. Jacobowitz, Computer Arithmetic, 1962, John F. Rider

ELECTRONICS 30

Unit 1 Computer Systems

Course Content

What the student should be able to:

DO	KNOW
1. Analyse computer systems to determine input and output	1. Study the computer system
	2. Function of units

Unit 2 Industrial Controls

3. Calibrate a voltmeter to measure - R.P.M. - Airpressure - Wind speed	3. Telemetering and remote control

Unit 3 and 4 Special Study

4. Student research and development of special interest area
   - F.M.
   - Video
     Computer
   - Industrial control

References to be selected.

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For Reference

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